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~~ABSTRACT~~

The present invention provides a polymer electrolyte fuel cell wherein a unit cell composed of a polymer electrolyte membrane, a cathode and an anode each having a catalyst reaction layer and disposed across the polymer electrolyte, a separator having a means for supplying a fuel gas to the anode and a separator having a means for supplying an oxidant gas to the cathode, a current collector plate, an insulating plate, and an end plate are laminated, the polymer electrolyte fuel cell being installed, inside the end plates disposed on both ends of the polymer electrolyte fuel cell, or between the insulating plate and either the current collector plate or the end plate, with a total heat exchanger for concurrently moving heat and humidity from an discharged gas toward the fuel gas and oxidant gas. This structure enables efficient use of cooling water after use thereby facilitating realization of a polymer electrolyte fuel cell having a compact internal total heat exchanger.